18. (new) The stretch of rail as claimed in claim 15, wherein the switch element made from the high-alloy steel has a hardness between 170 and 230 HB.

19. (new) The stretch of rail as claimed in claim 6, wherein the medium-alloy low-carbon steel has a hardness between 350 and 390 HB.

20. (new) The stretch of rail as claimed in claim 15, wherein the railway switch element and the length of rail are welded by flash welding and forging.

21. (new) The stretch of rail as claimed in claim 15, wherein there is no heat treatment after the welding of the railway switch element and the length of rail.

REMARKS

The Examiner is thanked for the due consideration given the application. This amendment is being filed concurrent with a Request for Continued Examination.

Claims 1, 2 and 4-21 are pending in the application. Claim 1 has been amended to set forth that the railway switch element and the length of rail are welded to each other. Claims 15-21 are newly presented and set forth previously claimed embodiments of the present invention in which the bainitic steel is carbide-free.

No new matter is believed to be added to the application by this amendment.

Art Rejections

Claims 1-2, 4-9, and 11-14 have been rejected under 35 U.S.C. § 103(a) as being obvious over KAIS (US 6,177,205) in view of BHADESHIA (US 5,879,474). Claim 10 was rejected under 35 U.S.C. § 103(a) as being obvious over KAIS and BHADESHIA and the related art described in the last six lines of page 3 of the specification.

Traversal of these rejections is respectfully maintained.

The present invention pertains to a welded stretch of rail that is formed from bainitic steel. Typically, claim 1 of the present invention sets forth:

> *"A stretch of rail comprising a railway switch element made from high-alloy steel, in which at least one alloy element has a content equal to at least 5% by weight, and a length of rail made from medium-alloy steel,* ***directly welded*** *to one another by a weld without deposition of metal, wherein the length of rail is formed from a medium-alloy low-carbon steel in which the carbon content is less than 0.55% by weight* ***and which is a bainitic steel."***

Independent claim 12 of the present invention sets forth a length of rail that is bainitic. The welded bainitic rail of the present invention is illustrated in Figures 1 and 2 of the application, which are reproduced below.

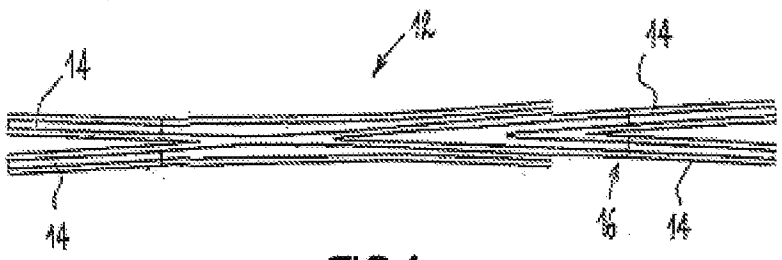


FIG.1

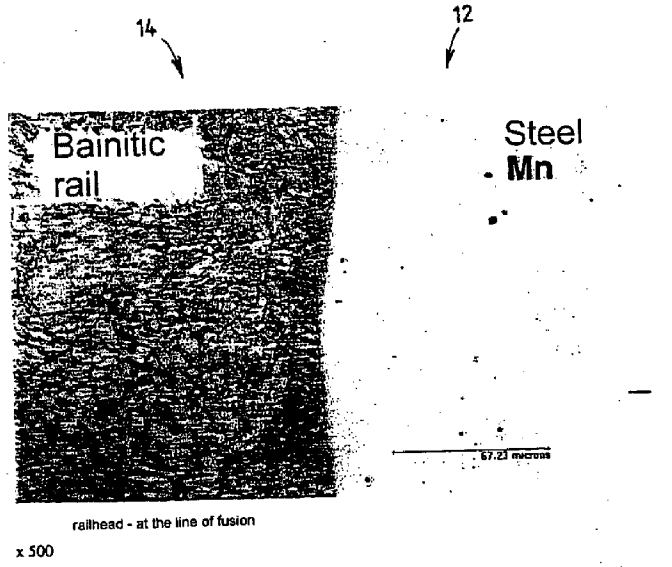
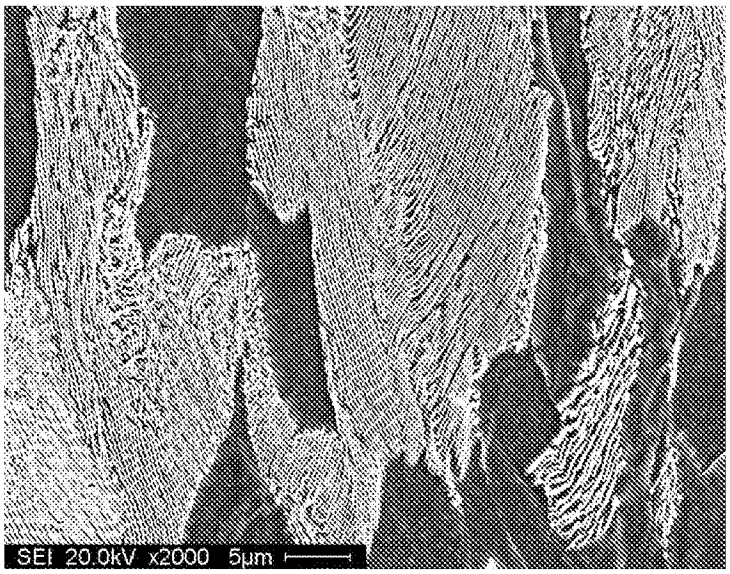


FIG.2

Figure 2 of the application shows the appearance of a weld 16 which is schematically illustrated in Figure 1. On this microphotograph, which is enlarged five hundred times, the welded interface appears to be very neat between the low-carbon bainitic steel and the high-alloy steel, the two steels being interpenetrated in a satisfactory manner. This represents a result that is truly unexpected over the applied art references.

Now consider the applied art references.

KAIS discloses a railroad track composed of: (i) a carbon steel, which is a ***mixed micrographic structure comprising 30-40% bainite and at least 50% pearlite***, and (ii) a high-manganese steel. That is, the carbon steel in KAIS has a structure of at least 50% pearlite. As a comparison, a pearlite structure is depicted below.



Source: http://en.wikipedia.org/wiki/File:Pearlite.jpg

This ***mixed*** steel in KAIS is neither the same nor infers the steel in the length of rail of the present invention, which has ***a micrographic structure being essentially or totally bainitic*** (see claims 1 and 12). Claim 12 recites: "wherein the length of rail made of medium-alloy steel consists essentially of a medium-alloy low-carbon steel in which the carbon content is less than 0.55% by weight and said medium-alloy low-carbon steel is bainitic." Indeed, such claim language excludes the carbon steel in KAIS having a mixed structure of at least 50% pearlite.

Furthermore, rails made of steel having a mixed structure comprising 30-40% bainitic and more than 50% pearlite of KAIS ***cannot have the same properties*** (mechanical and so on) of the claimed rails of the present invention, in which the medium-alloy low-carbon steel is only a bainitic steel. This is evident from the well understood principles that the microscopic

structure and properties of steel resulting from heat treatments (during manufacturing process), and they depend on the chemical composition and the heat treatment (or more generally, the heat history of the steel).

This microscopic structure can be ferrite, pearlite, bainite, martensite or austerite, or a combination of two or more of these structures. The properties of the steel depend from the structure, from the chemical composition, and from heat treatment. The structure can be recognized by examination under a microscope.

Thus, as the structure of the steel rails in claims 1 and 12 is bainitic, these rails are ***different*** from the rails of KAIS, which are made of a steel whose microstructure (or micrographic structure) formed from at least 50% pearlite. As the microstructures are different, so the properties are different.

BHADESHIA and the related art described in the last six lines of page 3 of the specification do not address the failures of KAIS described above.

That is, the applied art does not have a structure that is essentially or totally bainitic, but instead has a microstructure which is mainly (at least 50%) pearlitic. As a result of this difference, the properties of the steels, specifically the weldability, are not the same.

Further, claim 1 of the present invention now sets forth that the components are “directly welded to one another by

a weld without deposition of metal." This clearly excludes an insert between the railway switch element and the length of rail.

That is, while the present invention has a smooth interpenetration of the two steels (as shown in Figure 2 above), the rail of KAIS has an intermediate layer 18, 20 that is formed and then joined (column 4, lines 6-10).

One of ordinary skill and creativity would thus fail to produce a claimed embodiment of the present invention from a knowledge of the applied art. A *prima facie* case of unpatentability has thus not been made.

Also, the present invention displays results unexpected over the applied art. First, these unexpected results are shown in the weld quality of the photomicrograph of Figure 2, reproduced above. Additional unexpected results are shown in the hardness properties shown in Figures 3 and 4, reproduced below.

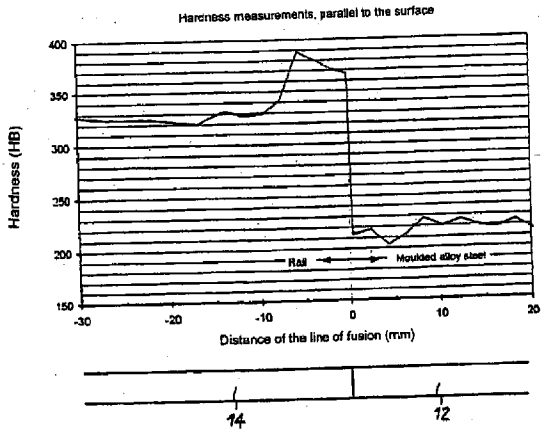


FIG.3

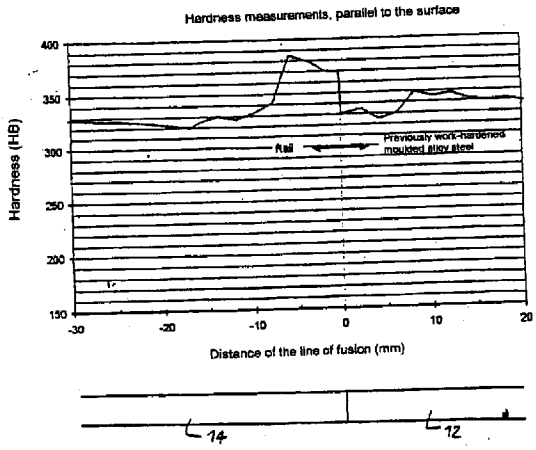


FIG.4

Here, it is observed that, with the compositions according to the invention, the hardness remains satisfactory in the immediate vicinity of the weld, and is not less than the hardness specific to the two elements which are welded to one another, and that in particular there is no drop in the hardness in the heat-affected zone (HAZ).

That is, these drawing figures show that, in its running part, the length of rail 14 has a hardness of between 290 and 330 HB and that this hardness increases to reach a value close to 380 HB in the immediate vicinity of the weld. The hardness of the stretch of rail remains at a value of between 185

and 235 HB in the switch element 12 made from high-alloy steel. This hardness corresponds to the hardness of the switch element before welding.

The advantages of the present invention are thus clear, and any unpatentability of the present invention that could be alleged is fully rebutted.

These rejections are believed to be overcome, and withdrawal thereof is respectfully requested.

CONCLUSION

The rejections are believed to have been overcome, obviated or rendered moot. No issues remain. The issuance of a Notice of Allowability is accordingly respectfully solicted.

The Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit Account No. 25-0120 for any additional fees required under 37 C.F.R. § 1.16 or under 37 C.F.R. § 1.17.

Respectfully submitted,

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